



Rapid Response

1402 Third Avenue, Suite 1420
Seattle, Washington 98101
Tel 206-352-2050
Fax 206-352-2049
www.pprc.org

Rapid Response Research Service
Environmental Considerations for Dust Control Measures
Requestor: Clean Water Services, Oregon

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Request

From an environmental perspective, what are the best dust palliatives or dust suppressants for unpaved roads or yards (such as a lumber yard).

Background

Unpaved dirt roads, parking areas, or other dirt surfaces used for vehicle traffic, may require temporary stabilization of surface soils to minimize airborne dust. This is especially important during dry seasons. *(Note that the scope of this information request applies customarily to unpaved roads and vehicle traffic areas, however, suppressants may also be other surfaces such as tilled/fallow agricultural fields, temporary vacant land, construction sites, and earth moving activities such as mining and landfills).*

Dust from unpaved surfaces is not only a nuisance, but also reduces driving visibility, affects the health of road users and others exposed to fine dust particulate which can be carried several hundred feet away from the original site, and increases wear-and-tear on vehicles. Potential additional issues may be fugitive dust penetrating nearby homes and covering crops, stunted crop growth due to clogged plant pores, the loss of fine particles (fines) which act as a road binder, and runoff which carries particulate into nearby streams, creeks and lakes - increasing turbidity.

In some areas there are regulations that limit the amount of particulate allowed in the atmosphere. Fine particles, including dust, act to help hold the surface of unpaved roads together. With a loss of fine particles from the roadway, there is an increase in roadway surface raveling and maintenance costs. These fines are smaller than what the eye can see [1].

Factors affecting the release of dust include such variables as: vehicle speed, weight, number of wheels, the amount of vehicle traffic, particle size distribution (gradation) of the surface material, compaction, and ambient and surface moisture.

There are different types of dust palliatives (or dust suppressants) including water, and physical or chemical palliatives. Chemical suppressants include formulations containing salts (e.g., magnesium chloride, calcium chloride), organic petroleum products, non-organic petroleum products, emulsified asphalts, lignin products, vegetable or citrus oils, electrochemical products, synthetic polymers, molasses, and clay additives. Many of these are applied in liquid form. Physical palliatives may include mulch, gravel, and woven geotextiles.

PPRC did not identify any federal regulations controlling the application of dust palliatives, however some states and air agencies have developed guidelines. One example is Nevada's Interim Policy on Dust Palliative Use in Clark County, NV. Local and state agencies should be contacted to determine if policy has been established for dust palliative use.

Findings / Recommendations

Environmental Consequences:

Using water as a dust palliative obviously consumes an increasingly scarce commodity: water. As a dust suppressant, water is not long-lived and at some sites, may have to be applied several times per day to meet particulate level.

Some of the potential environmental consequences of applying and using chemical dust palliatives include: [2]

- Airborne transformation and transport of chemicals during or after application, especially if volatile substance
- surface runoff
- plant uptake
- ingestion by animals (and subsequent ingestion of exposed animals by humans)
- infiltration to the water table
- occupational contact
- potential impacts on soil microbiology
- human or animal consumption of contaminated groundwater

Selection:

While it may be tempting to select the lowest priced product, choosing a palliative with functionality optimized for the local soil conditions may result in the best performance and the lowest overall cost. PPRC urges you to consider the environmental impacts of any potential dust palliatives, including impacts from direct water consumption. An excellent USEPA report is available which discusses these concerns: "[Potential Environmental Impacts of Dust Suppressants: Avoiding Another Times Beach](#)" (2002). [The Expert Panel Summary](#), especially Section 5, which offers guidance on soil characterization as well as minimizing environmental impacts [2].

An additional guidance document is the U.S. Department of Agriculture's [Dust Palliative Selection and Application Guide](#) [3]. Although this document was published in 1999, and therefore may not cover more recent product development, it offers valuable information on product selection based on attributes, limitations, application (process and frequency), origin, and environmental impact.

The United States Department of Agriculture also manages a bio-based purchasing program for federal agencies, called [BioPreferred](#)SM. The program has proposed bio-based dust suppressants as a designated material for purchase by federal agencies. The [Item Designation](#) [4] document provides summary information supporting this designation, and lists 12 manufacturers of bio-based suppressants and rates some of the products on life cycle costs.

Additional references and websites are listed below, which offer field study results or comparisons of different types of products. (*Disclaimer: PPRC does not endorse any of these studies, especially when conducted by a dust suppressant product manufacturer, and does not endorse or confirm any performance claims for any dust palliative products for any products mentioned*).

Application:

Environmental stewardship practices include the following recommendations: [3, 5]

- During preparation for application of dust palliatives, construct gravel berms at the low shoulders of the roadway to inhibit liquid palliatives from entering surface waters, via roadway ditches leading to streams, water drainages, or via runoff.
- Do not apply dust palliatives during rain.

- Do not apply materials in a manner that is detrimental to either water quality or vegetation.
- Carry adequate spill protection.
- Use environmentally sensitive cleaning agents.
- Dispose of excess materials at appropriate sites.
- Review the manufacturer's material safety data sheet (MSDS) and instructions for handling, mixing, and applying dust suppressants, minimizing exposure to the applicator and the surrounding environment.
- Conduct water quality sampling of the surrounding area before and after dust palliative application.
- Restrict the use of chlorides within 8 meters (25 feet) of a body of water and low-salt-tolerant vegetation.
- For lignosulfonates, determine prior to application if significant migration might occur from the treated area into local streams, ponds, and lakes, affecting the oxygen needs of any aquatic community.

Additional recommendations may be gleaned from this 2001 document: [Interim Policy on Dust Palliative Use in Clark County, NV](#).

Other Prevention and Best Practices: [6]

- Prepare a dust control plan.
- Vegetate or mulch areas where little or no vehicle traffic occurs.
- In lieu of chemical-based suppressants, evaluate whether gravel or landscaping rock is a better alternative.
- Construct natural or artificial wind breaks.
- Lower speed limits.
- Encourage alternate routes for very dusty roads.
- If water is used as a dust palliative, evaluate the reuse of water from some other site or nearby operation rather than using city water.
- Optimize fuel- and/or energy-efficiency for the application equipment.

References

- [1] Mohave County. 2007. [Long Mountain Area Plan](#).
- [2] Piechota, et al. 2002. [Potential Environmental Impacts of Dust Suppressants: "Avoiding Another Times Beach". An Expert Panel Summary](#). U.S. EPA and University of Nevada, Las Vegas.
- [3] U.S. Department of Agriculture. 1999. [Dust Palliative Selection and Application Guide](#). Project Report 9977-.1207-SDTDC.
- [4] USDA. 2006. [Proposed Item for Biobased Designation](#).
- [5] Center for Environmental Excellence. Chapter 10: [Roadside Management and Maintenance: Beyond Vegetation](#). American Association of State Highway and Transportation Officials
- [6] Langston. 2008. [2008 Road Dust Management Practices and Future Needs Conference](#).
- [7] Clark County Board of Health. 2001. [Interim Policy on Dust Palliative Use in Clark County, NV](#).
- [8] Epps, A. 2002. Laboratory Study of Dust Palliative Effectiveness ([Abstract](#)). *Journal of Materials in Civil Engineering*, Vol. 14, No. 5.
- [9] [Dust – The Issue](#) by Syntech® Products.
- [10] [Dust Stop](#) by Cypher International Ltd.
- [11] Innovative Company. Undated. [Control Dust; Control Unpaved Road Quality and Costs](#).